

FABRICATION OF AN ARRAYED WAVEGUIDE  
GRATING DEVICE WITHIN A SEMICONDUCTOR STRUCTURE

ABSTRACT OF THE DISCLOSURE

5 High quality epitaxial layers of monocrystalline materials can be grown  
overlying monocrystalline substrates such as large silicon wafers by forming a  
compliant substrate for growing the monocrystalline layers. An accommodating  
buffer layer comprises a layer of monocrystalline oxide spaced apart from a silicon  
wafer by an amorphous interface layer of silicon oxide. The amorphous interface layer  
10 dissipates strain and permits the growth of a high quality monocrystalline oxide  
accommodating buffer layer. The accommodating buffer layer is lattice matched to  
both the underlying silicon wafer and the overlying monocrystalline material layer.  
Any lattice mismatch between the accommodating buffer layer and the underlying  
silicon substrate is taken care of by the amorphous interface layer. In addition,  
15 formation of a compliant substrate may include utilizing surfactant enhanced epitaxy,  
epitaxial growth of single crystal silicon onto single crystal oxide, and epitaxial growth  
of Zintl phase materials. An arrayed wavelength grating device is formed overlying  
the silicon wafer.